

ART. VIII.—*Four New Echinoids from the Australian Tertiary.*

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(With Plates XIII.-XVI).

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The present paper contains descriptions of  
*Echinoneus dennanti*, n. sp.  
*Prenaster aldingensis*, n. sp.  
*Brissopsis tatei*, n. sp.  
*Schizaster sphenoides*, n. sp.

Advantage of the opportunity has been taken to figure and re-describe *Schizaster abductus*, Tate, which was not very fully diagnosed by the author, and was not illustrated.

All the species are of Barwonian age, that is, belonging to the oldest of our Tertiary series.

***Echinoneus dennanti*, n. sp.**

Test elongate, slightly wider just behind the apical system. Flattened dorsally and actinally, depressed, with a thickly rounded ambitus. Of the four genital openings the posterior lateral pair are slightly the largest and are separated by about their own width.

Ambulacra similar, flush, continuous from apex to peristome, broadest at the ambitus. Poriferous zones narrow, straight, not sunken. Pairs of pores very numerous. On the abactinal surface a line joining the pores of each pair is normal to the length of the zone. Towards the ambitus and actinally this line becomes more and more oblique, so that near the peristome the pores tend to, but do not quite, become arranged in a single linear series, the pores of each pair being closer together than those of the next succeeding pair.

Peristome large, triangular, and showing the curious obliquity of the genus. Periproct large, long, oval, pointed at the posterior end.

Tubercles sunken, crowded, imperforate. There do not seem to be any of the generically characteristic tubercles of epistoma, the spaces between the tubercles being smooth. This, however, may possibly be due to weathering.

#### MEASUREMENTS.

Length, 21. Breadth, 14. Height 7.

The genus has not been previously recorded from our older tertiary. It ranges from the Miocene in the West Indies, and there are two very widely-spread recent species.

Locality.—“Filter Quarries,” Batesford, one specimen somewhat obliquely crushed, and a fragment. Barwonian (? Eocene).

#### *Prenaster aldingensis*, n. sp.

Test small, oval, tumid, posteriorly truncated, flattened actinally, Apical system small, excentric in front. Peristome transverse, slightly crescentic in front (damaged posteriorly). Ambulacra in extremely faint depressions near the apical system, the depressions only noticeable in oblique light. At about two mm. from the apex the ambulacra have become flush. Pores minute, round, the pairs about their own width apart. Ambulacra narrow, straight, open. Towards the ambitus the pores of the odd ambulacrum are elongate slits, very far apart. Actinally, round the peristome the pores are also slit-like.

Periproct high on the posterior truncation ; as far as can be seen, it is large and pointed at its upper end.

Primary tubercles very small, perforate, crenulate, scrobiculate. They are sparsely scattered over the dorsal surface. There are four rather large ones at the apex, which are apparently close to the outer sides of the basal pores. The tubercles are larger dorsally on the anterior ambulacra, and also actinally, near the ambitus. The sternum is hidden by matrix. There is a faint ridge bounding the scrobicular areas, which are not sunken. Actinally the tubercles are excentric anteriorly on the scrobicular areas. Outside the scrobicules is in most cases a single row of miliaries forming a ring, and a few scattered miliaries occur as well.

Only one basal pore is visible, and that doubtfully. It is the right posterior lateral, and is close to the inner side of a large primary tubercle, as above mentioned.

The madreporite is long and narrow and separates the posterior basals and radials, as well as the right anterior radials. The radial pores are as large as the ambulacral pores, and are five in number.

The fascioles are very narrow and consist of two close-set rows of miliaries. The peripetalous is slightly pointed posteriorly in the posterior interradius. Anteriorly it disappears before reaching the antero-lateral ambulacrum, and it is uncertain whether it joins the marginal. The marginal fasciole dips below the ambitus anteriorly, and runs close to it in front of the peristome. As the posterior truncation is hidden by matrix its course here is not visible.

#### MEASUREMENTS.

Length, 21. Breadth, 18.5. Height, 14.

Distance of front edge of peristome from anterior, 5 mm.

Width of posterior lateral ambulacrum near fasciole, 1.5.

Length of anterior lateral petal, 6.

Length of posterior lateral petal, 5.5.

The genus is typically Eocene, but ranges into the Miocene in Europe, one species, *P. excentricus*, Wright, occurring in the Tortonian of Malta.<sup>1</sup> The present species is very unlike it, judging by Dr. Wright's figure<sup>2</sup> and description<sup>3</sup>.

The genus is new for our tertiaries.

Locality.—Aldinga (Barwonian, ? Eocene). A single specimen collected by Mr. R. H. Cummins, B.Sc.

#### *Brissopsis tatei*, n. sp.

Test thin, broadly ovate, depressed. Vertex about a third of the length from the posterior end. Apical system nearly central. Ambulacra sunken. Anterior groove broadly indenting the ambitus. Lateral ambulacra curved. The antero- and postero-lateral of the same side forming a segment of a circle, the

1 Gregory, J. W., *Trans Roy. Soc., Edinburgh*, 36 (1891), p. 630.

2 Q. J. G. S., 20 (1864), pl. 22, fig. 3.

3 *Ann. Mag. Nat. Hist.*, s. ii., vol. 15 (1855), pp. 195, 196.

segments of the opposite sides touching at the apex. The outer ends of the postero-laterals are half the distance apart that the outer ends of the antero-laterals are. Actinally the ambulacra are broad and bare. Peristome crescentic. Labrum not prominent.

Peripetalous fasciole crossing the anterior groove at about half the diameter of the test from the apex. It runs back parallel to the groove for about 8 mm., and then bends out to the outer end of the antero-lateral petal. Thence it curves inwards following the curve of the petals, and between the outer ends of the posterior petals is straight. Its form is almost exactly that figured by A. Agassiz for *B. lyrifera* in his "Revision" (pl. xix., fig. 9). The subanal fasciole is concave above. The presence of an anal branch is doubtful.

There are four perforate basals.

#### MEASUREMENTS.

	Length.	Breadth.	Height.	Post lat. petal.	Ant. lat. petal.	Apical Syst. from Anterior.
1.	- 46	- 41	- 24	- 6	- 6	- 27
2.	- 47	- 41	- 23	- -	- 7	- 27

The fine calcareous matrix is closely adherent to all the numerous specimens before me, and many are crushed and broken.

Professor R. Tate has recorded *Toxobrissus* sp. from our Older Tertiary. This is a synonym of *Brissopsis*, and the record perhaps refers to the present species.

In the curvature and mutual relationships of the ambulacral petals and in the shape of the peripetalous fasciole, the affinities of the present species are not with such an Eocene form as the Sindian *B. sufflatus*, Duncan and Sladen, but rather with the existing *B. lyrifera* and *B. luzonica*, and more especially with the latter. From it, however, it is distinguished by the closer approximation of the outer ends of the postero-lateral petals and by its more broadly oval form and less pointed posterior end. It also closely resembles *B. crescenticus*, Wright, from the Malta Oligocene, but is easily separable by the closer approximation of the posterior petals posteriorly, and by the greatest width being behind the apical system, and not in front of it.

Locality.—Cliffs at mouth of Sherbrooke River (type), and at various localities along the coast in the neighbourhood. Also a cast from the clays of Grice's Creek. Barwonian (? Eocene).

**Schizaster sphenoides**, n. sp.

Broadly ovate, depressed, somewhat pointed posteriorly. Anterior groove indenting the ambitus to a depth of about 8 mm. in specimens the size of the type. Dorsal surface rising steadily to the vertex which is on a rather sharp median keel, and about one-third of the total length from the posterior end.

Lateral petals in rather deep grooves; the anterior laterals at first curved and then straight. The posterior straight, lanceolate, and very short. Odd ambulacrum in a deep groove, 6 or 7 mm. deep in specimens the size of the type, with a flat floor and overhanging edge, so that the paired pores are not visible from above.

Sternum flat, lanceolate, followed posteriorly by a pair of tumidities, between which a shallow groove runs up to a subanal concavity. Hind end truncate, overhanging above, the oval periproct near the summit of the truncation. Peristome lunate, visible from the front, with a well-developed labrum. Actinally the posterior lateral ambulacra are on broad areas that slope strongly up to the ambitus medially and posteriorly.

There are four perforate basals. Tubercles larger on the sternum, and crowded; not so crowded, but as large on the other interambulacra actinally. Small on the dorsal surface.

Peripetalous fasciole crossing the anterior sulcus, in specimens the size of the type, at about 5 mm. from the ambitus; thence straight to outer end of anterior lateral petal. A deep re-entering angle between the antero- and postero-lateral petals, and straight between the posterior petals. Lateral fasciole given off from the peripetalous at about a quarter of the length of the anterior lateral petal from its outer end, crossing the ambitus at about 10 mm. from the periproct, and passing below it at about the same distance.

MEASUREMENTS.

	Length.	Breadth.	Height.	Antero-Lateral Petal.	Postero-Lateral Petal.
1.	- 66	- 60	- 38	- 25	- 7.5
2.	- 66	- 60 ? (damaged)	35	- 24	- 8
3.	- 48	- 47	- 23	- 18	- 6.5

(No. 1 is the figured specimen.)

Locality.—Base of cliffs at mouth of Sherbrooke River, common, but usually crushed. Associated with *Eupatagus laubei*, *Maretia anomala* and *Brissopsis dennanti*. At a higher level *Lovenia forbesi* is common, but I have not found it below. Most of the specimens in the lower bed have patches of spines still attached. These and the matrix adhere very closely, and I have not been able to clear them with the dental engine. Exposed portions are usually sandpolished by the action of the surf. Barwonian (? Eocene).

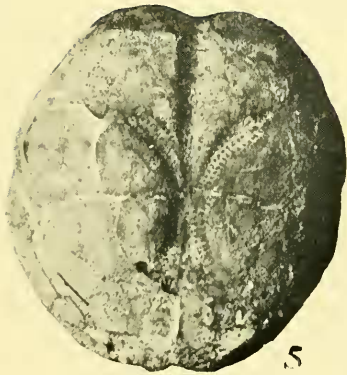
### *Schizaster abductus*, Tate.

1891. Tate, Tr. and Proc. Roy. Soc. S. Australia, p. 281.

Tate's description consists mainly of a comparison of the species with *S. australis*, Gray, and is unaccompanied by a figure.

A specimen in my collection from the type locality, Morgan, given me by Master Frank Cudmore, is in a much better state of preservation than Tate's two examples, the larger of which is the type. For the loan of these I have to thank Mr. W. Howchin, F.G.S., actual comparison being necessary for identification.

The species is broad-ovate, pointed posteriorly. In lateral view the dorsal surface rises regularly from the anterior end to the vertex, which is on a median ridge, two-thirds of the distance between the apex and the posterior end. Base slightly tumid. Subanal area vertical. Periproct its own height below the top of the overhanging posterior projection and visible from below. Anterior ambulacrum in a deep groove which only slightly indents the ambitus. Lateral petals in grooves as deep as that of the anterior ambulacrum. Anterior lateral at first widely diverging and then running forwards at about 40 deg. with the mid-dorsal line. Their length slightly less than one-third of the transverse diameter. Length of posterior petals about a fifth of the transverse diameter of the test. Less divergent than the anterior ones. Peristome lunate, posterior lip prominent. Peripetalous fasciole crossing the anterior ambulacrum at a distance from the apex equal to the semi-diameter through the apex. From here it runs with a scarcely perceptible re-entering angle to the anterior lateral petal. Between the lateral petals it forms a deep re-entering angle, keeping close to the edges of the



5



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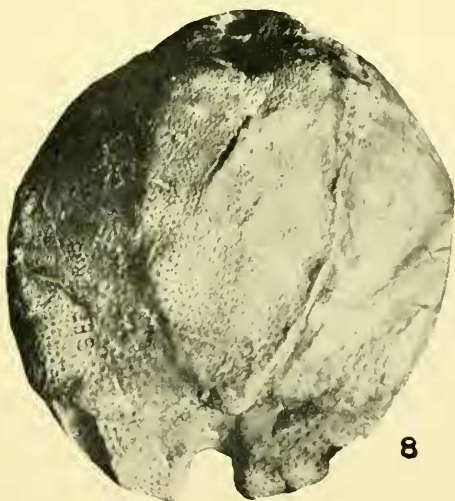
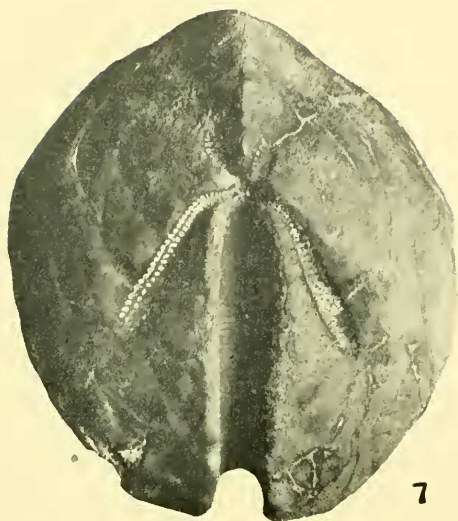
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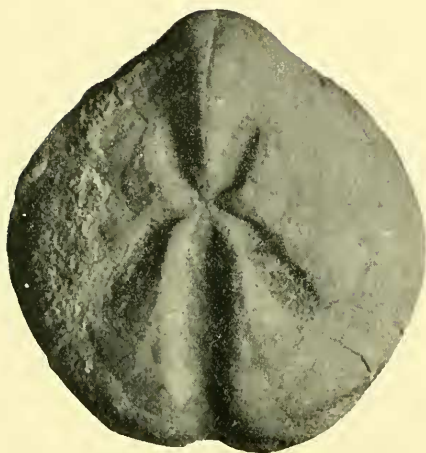
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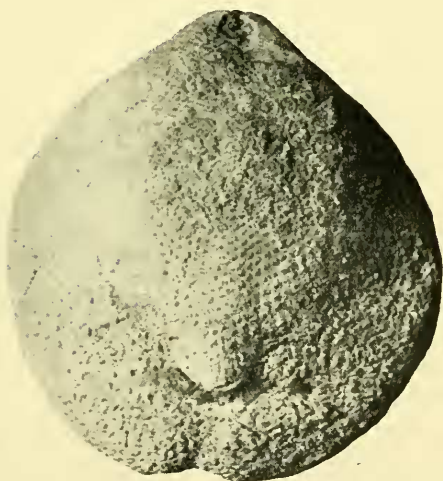
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11



12

grooves. Between the posterior petals it is almost straight. The lateral fasciole leaves the peripetalous at about one-third of the length of the anterior lateral petal from its outer end, and keeps well on the dorsal surface till opposite the outer end of the posterior petal, when it bends downward to pass under the periproct at a distance below it equal to the length of the posterior petal. There are four perforated basals.

MEASUREMENTS.

	1	2	3
Length - -	58 (damaged)	48	61
Breadth - -	55	45	56
Height - -	35	28	35
Post. lat. petal -	13	8.5	12
Ant. lat petal -	20	15	20

1 Tate's type; 2 his smaller specimen; 3 the author's specimen. All from Murray River cliffs at Morgan. No. 3 is the figured specimen.

I have specimens of what I believe to be this species from Table Cape and Spring Creek, but both are somewhat crushed. Mr. J. Dennant also has the species from Table Cape.

EXPLANATION OF PLATES XIII.-XVI.

- Figures 1, 2.—*Echinoneus dennanti*, n.sp. Slightly obliquely crushed.
- „ 3, 4.—*Prenaster aldingensis*, n. sp. Outline sketches showing fascioles. A., apical system. Ps., peristome. Pr., Periproct.
- „ 5, 6.—*Brissopsis tatei*, n. sp.
- „ 7, 8, 12.—*Schizaster sphenoides*, n. sp. Slightly distorted.
- „ 9, 10, 11.—*Schizaster abductus*, Tate.
- All the figures are about natural size.